

Applicants: Christoph Hock et al.
Serial No.: 10/554,314
Filed: April 19, 2006
Page 5

REMARKS

Claims 1, 3-7 and 11-18 are pending in the subject application. Claims 11-17 are withdrawn from consideration as being drawn to non-elected inventions. Applicants have hereinabove amended claims 1 and 5-7 and canceled claim 3 without disclaimer or prejudice to applicants' right to pursue the subject matter of these claims in the future. Support for the amendment to claim 1 may be found in the specification, *inter alia*, at page 3, first full paragraph and the last full sentence as well as the first sentence of each of the following paragraphs up to page 5; page 10, lines 5-13; page 13, lines 1-4; Figure 3 and the corresponding figure legend at page 21, last full sentence. The amendments to claims 5 to 7 have been effected for the sake of conformity with the amendment to claim 1. Upon entry of this Amendment, claims 1, 4-7, and 18 will be pending and under examination.

Information Disclosure Statement

Applicants note that the Examiner indicated on the bottom of each page of the PTO Form 1449 (substitute) which was included with the mailing of the May 28, 2008 Final Office Action that "all references considered except where lined through".

Applicants note that the M.P.E.P. does not specify whether such a statement at the bottom of each page by the Examiner provides a clear record of which citations have been considered by the Patent Office. Applicants have attached hereto as **Exhibit A** a copy of the PTO Form 1449 (substitute) which was filed with the May 6, 2008 Information disclosure statement. Applicants respectfully request that the Examiner clearly indicate, in compliance with M.P.E.P. §609.05(b) or M.P.E.P. §609.08, which references have been considered by the Examiner by initialing next to each reference.

Withdrawn Rejections

Applicants note that the Examiner has withdrawn, on page 2 of the May 28, 2008 Final Office Action, the rejection of claims 1-4, 8 and 18 under 35 U.S.C. §102(b) as being anticipated by Dodel et al.

Applicants: Cristoph Hock et al.
Serial No.: 10/554,314
Filed: April 19, 2006
Page 6

Applicants note that the Examiner has withdrawn, on pages 2 and 3 of the May 28, 2008 Final Office Action, the rejection of claims 1-10 and 18 under 35 U.S.C. §102(e) as being anticipated by Schenk et al.

Rejection Under 35 U.S.C. §112

The Examiner maintained the rejection of claims 1, 3-7 and 18 under 35 U.S.C. §112, first paragraph. Specifically, on page 3 of the May 28, 2008 Final Office Action, the Examiner states that "Claims 1, 3-7 and 18 stand rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for detecting an increased level of immunostaining on brain sections of APP^{SW}xPS1^{M146L} transgenic mice or increased levels of antibodies against β-amyloid in serum and CSF samples of Alzheimer disease (AD) patients who are immunized with Aβ peptides, AN1792(QS-21), and detecting a positive correlation between the increased immunostaining and improvement of immunization treatment in AD patients, does not reasonably provide enablement for a method of monitoring an immunotherapy in a subject suffering from Alzheimer's disease by contacting all types of test samples with all forms of amyloid plaque (including all fragments, derivatives or mutants) in all types of tissue sections and comparing the level of immunoreactivity to an undefined reference value of AD as broadly claimed."

In response, applicants respectfully traverse the Examiner's ground of rejection. Nevertheless, without conceding the correctness of the Examiner's rejection, applicants note that claim 1 has been amended to recite that the presence of immunoreactivity in the test sample against β-amyloid plaques in brain tissue section is indicative for the positive clinical outcome of the immunotherapy as taught in the present application. Thus, an antibody containing test sample and a brain tissue section is to be used in the claimed method, thereby obviating the Examiner's first ground of rejection at page 4 of the Final Office Action.

Furthermore, the Examiner alleges that "only brain sections of APP^{SW}xPS1^{M146L} double transgenic mice can be used in the claimed method".

Applicants: Cristoph Hock et al.
Serial No.: 10/554,314
Filed: April 19, 2006
Page 7

In response, applicants respectfully traverse the Examiner's ground of rejection. First of all, it is noted that the statement of the specification at page 7, lines 15-18 referred to by the Examiner is made in respect to the examples of the present application and therefore related to the transgenic mice. However, this observation is generalized by the following explanation teaching that the bona fide β -amyloid generated in the physiological environment of the brain is related the clinically important qualitative characteristics of the antibodies:

"Notably, the TAPIR scores of the immune sera as determined by analyzing human β -amyloid on brain sections of transgenic mice were more predictive for the therapeutic outcome than antibody titers measured by ELISA. This may be **related to clinically important qualitative characteristics of the antibodies** with respect to epitope recognition, affinity and avidity of the antibodies **to react with bona fide humans β -amyloid generated slowly over time in the physiologic brain environment**-as opposed to artificial binding conditions of the antibodies to A β immobilized on plastic ELISA plates. Despite the fact that the TAPIR scores were statistically correlated with ELISA titres of serum antibodies against A β ₄₂ ($r_s=0.700$, $p < 0.001$), there was a subgroup of patients with widely discrepant results of these two measures, suggesting that the degree of **selectivity of the antibodies for bona fide human β -amyloid is an important determinant for the clinical efficacy of immunotherapy of AD**"; see the specification at page 7, lines 15-28. (emphasis added)

Therefore, contrary to the Examiner's assertion, the specification teaches that any brain tissue section with bona fide human β -amyloid plaques can be used in the claimed method. Applicants note further that claim 1 has been amended to recite brain tissue section containing β

Applicants: Cristoph Hock et al.
Serial No.: 10/554,314
Filed: April 19, 2006
Page 8

amyloid plaques, thereby obviating part of the Examiner's ground of rejection.

Applicants also maintain that the specification is enabling for the method as recited in amended claim 1.

This is confirmed by the scientific community having given due account to the corresponding scientific publication by Hock et al., Neuron 38 (2003), 547-554, copy of which is attached hereto as **Exhibit 1**, which is the scientific publication by the inventors of the experiments described in the present application.

For example, Wang et al., Journal of Alzheimer's Disease 14 (2008), 161-173, copy of which is attached hereto as **Exhibit 2**, successfully employed the TAPIR assay of the present invention simply by using the disclosure of the Hock et al. publication, the disclosure content of which, as mentioned, corresponds to the experimental section of the present application; see Wang et al., for example at the abstract and at page 162, left column, lines 6-10 and page 164, section "Senile plaque staining" at the paragraph bridging the left and right column. As will be noted by the Examiner, brain tissue sections of deceased Alzheimer's disease patients have been used in order to perform the teaching of the Hock et al. publication and thus the teaching of the present application. Moreover, the Wang et al. publication confirms the advantages of the method of the present invention to identify anti-human β -amyloid monoclonal antibodies which have the potential of therapeutic application for Alzheimer's disease; see the abstract of the Wang et al. publication.

Further proof of the general applicability of the claimed method of the present invention is corroborated by international application WO 2007/022416 A2, copy of which is attached hereto as **Exhibit 3**, in which the TAPIR assay of the present invention has been employed with brain tissue sections of PDAPP mice, those mice being also described in Schenk et al. 1999 and Schenk (US'523). The PDAPP mice express human

Applicants: Christoph Hock et al.
Serial No.: 10/554,314
Filed: April 19, 2006
Page 9

β APP minigene encoding the 717_{V \rightarrow F} mutation associated with familial Alzheimer's disease; see WO 2007/022416 at paragraph [0050] at page 19 to paragraph [0051] at page 20, line 2.

Thus, various sources of appropriate β amyloid plaque containing brain tissue section were at disposal of the person skilled at the filing date of the present application that could and have been used in the method of the present invention. Furthermore, the general applicability of the method of the present invention as disclosed in the present application and in the corresponding Hock et al. publication has been acknowledged in the field; see the commentary by Sambamurti et al., Journal of Alzheimer's Disease 14 (2008), 175-177, copy of which is attached hereto as **Exhibit 4**, recognizing the TAPIR assay of the present invention as "an important development" in which "the immune response in vaccinated patients can be evaluated by using sections from either AD brain or transgenic mouse brain"; see Sambamurti et al. at page 176, left column, lines 19-25 and the last two sentences in the left column.

Thus, as understood by the person skilled in the art, brain tissue sections of deceased Alzheimer disease patients as well as brain tissue sections of any transgenic model for Alzheimer's disease can be employed in accordance with the method of the present invention, which leads to β -amyloid plaques in the brain, many examples of which are known to the person skilled in the art.

In addition, at page 4 of the Final Office Action the Examiner alleges that the specification fails to provide a standard for ascertaining the requisite degree of the recited reference value or level, and that therefore a skilled artisan would not know what to compare since the reference value or level is unknown.

In response, applicants respectfully traverse the Examiner's ground of rejection. Nevertheless, without conceding the correctness of the Examiner's rejection, applicants note that claim 1 has been amended to

Applicants: Christoph Hock et al.
Serial No.: 10/554,314
Filed: April 19, 2006
Page 10

recite that the presence of antibodies against β -amyloid plaques in brain tissue sections is indicative for the positive clinical outcome of the immunotherapy as taught in the present application, thereby obviating the Examiner's latter rejection. As explained in the specification, the presence of antibodies against β -amyloid plaques is associated with significantly higher numbers of patients who did not progress to the severe dementia stage; see the specification at page 21, last full sentence.

Furthermore, the specification at page 10, lines 5-13 and at page 13, in the description of the TAPIR assay teaches how to assess the ability of a test sample from a subject to contain antibodies recognizing β -amyloid in brain sections. In this context, the specification at page 13 explains in detail how, if desired, a standard curve may be generated in order to score patients whose corresponding test samples contain a high level of such antibodies, i.e. strong immunoreactivity. As the Examiner will note from the enclosed post-published references, the scientific community had no difficulty to apply the method of the claimed method as taught in the present application.

In addition, at page 5 of the Final Office Action the Examiner alleges that the specification fails to teach all forms of APP fragments, derivatives or mutants for the transgenic mice recited in claim 7.

In response, applicants respectfully traverse the Examiner's ground of rejection. Nevertheless, without conceding the correctness of the Examiner's rejection, applicants note that claim 7 has been amended to recite that the non-human animal is transgenic for human APP or a mutant thereof, thereby obviating the Examiner's rejection. As already explained above, various APP mutant transgenic animals were at the disposal of the person skilled in the art, wherein the expression of the transgene results in the development of β -amyloid plaques in the brain. Thus, claim 7, as amended is enabled and in commensurate in scope.

Applicants: Cristoph Hock et al.
Serial No.: 10/554,314
Filed: April 19, 2006
Page 11

In view of these remarks, applicants maintain that claim 1 and 7 as amended and the claims which depend therefrom satisfy the requirements of 35 U.S.C. § 112, first paragraph. Accordingly, applicants respectfully request that the Examiner reconsider and withdraw this ground of rejection.

Rejection Under 35 U.S.C. §112, second paragraph

In section 7 at page 6 of the Final Office Action, the Examiner rejected claims 1, 3-7 and 18 under 35 U.S.C. §112, second paragraph, as allegedly being indefinite or failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, the Examiner alleged that the specification fails to teach what a reference value of immunoreactivity representing AD is and what a level of immunoreactivity determined prior to onset of said immunotherapy in a subject is. Furthermore, according to the Examiner, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The Examiner further alleged that since the reference value or the level of immunoreactivity prior to the immunotherapy is unknown, a skilled artisan would not know what value or level would be considered higher. Because of this reason, the metes and bounds of the reference value or level allegedly cannot be determined.

In response, applicants respectfully traverse the Examiner's ground of rejection. Nevertheless, without conceding the correctness of the Examiner's rejection, applicants note that claim 1 has been amended to recite, in its relevant part,

"comparing said level of immunoreactivity to a level of immunoreactivity determined prior to onset of said immunotherapy in said subject, wherein an increase in the level of immunoreactivity as compared to the level of immunoreactivity determined prior to onset of said immunotherapy in said subject is indicative of a positive

Applicants: Cristoph Hock et al.
Serial No.: 10/554,314
Filed: April 19, 2006
Page 12

clinical outcome of said immunotherapy".

As the Examiner will note, the specification at page 6, first full paragraph; page 13, in particular lines 6 to 9 and lines 23 as well as Figure 3 and the specification at page 21 in the corresponding figure legend teach that the level of immunoreactivity is determined prior and after immunization, wherein patients with an increase in immunoreactivity did not progress to the severe dementia stage compared to patients lacking a corresponding increase in immunoreactivity; see the specification at page 19, the bridging paragraph to page 20 "TAPIR assay predicts clinical outcome".

In view of these remarks, applicants maintain that claim 1 as amended and the claims which depend therefrom satisfy the requirements of 35 U.S.C. § 112, second paragraph. Accordingly, applicants respectfully request that the Examiner reconsider and withdraw this ground of rejection.

Rejections Under 35 U.S.C. §103

The Examiner maintained the rejection of claims 1, 3-7 and 18 as allegedly unpatentable over Dodel et al. (EP1172378, published on January 16, 2002 as cited in the previous office action) in view of Schenk et al. (Nature 1999 400:173-177).

In response, applicants respectfully traverse the Examiner's ground of rejection. Applicants maintain that the combination of Dodel et al. with Schenk et al. does not render obvious applicants claimed invention for the reasons set forth below.

Specifically, applicants respectfully disagree with the Examiner's characterization of Dodel et al.

First of all, though Dodel (EP'378) teaches the detection of the levels of anti-A β antibodies and A β peptides in plasma and CSF, from the disclosure as a whole including the paragraphs relied on by the

Applicants: Cristoph Hock et al.
Serial No.: 10/554,314
Filed: April 19, 2006
Page 13

Examiner it is clear that the goal of Dodel is to decrease β -amyloid concentration in the human fluids like CSF by $A\beta$ /antibody complex formation in order to reduce the $A\beta$ deposition and plaque formation. Thus, Dodel at the cited paragraphs state:

"[0019] These data demonstrate that an antibody directed against $A\beta$ (anti- $A\beta$ antibody or short: $A\beta$ antibody) is present in physiologically relevant concentrations in human fluids, like CSF and serum. Antibody titres are significantly higher in control subjects than AD patients. **The generation of naturally occurring $A\beta$ -antibodies and subsequent $A\beta$ / antibody complex formation, may be involved in the normal clearance of $A\beta$ peptide(s)**, which serves to reduce $A\beta$ deposition and neuritic plaque formation" (emphasis added).

"[0038] As an example as to the therapy regimen 5 - 30 g (1 - 5 days) of IgG immunoglobulins (commercially available) or a corresponding amount of purified anti- $A\beta$ antibody are administered parenterally to the patient by the i.v. route. Levels of β -Amyloid, tau-protein as well as $A\beta$ -antibody are measured in the serum and CSF before and following the respective dose of IgG immunoglobulins for therapy control. **The goal is to decrease β -amyloid concentration in the CSF and by that decrease the plaque burden in Alzheimer's disease and alleviate the neuropsychiatric and neuropsychological defects in Alzheimer's disease. This treatment introduces a new therapeutic approach to Alzheimer's disease**" (emphasis added).

The mentioned paragraphs clearly teach that the antibodies intended by Dodel for therapeutic treatment are directed against β -amyloid in the human fluid, thus specifically recognizing soluble $A\beta$ in order to prevent plaque formation. Accordingly, it would make no sense in

Applicants: Cristoph Hock et al.
Serial No.: 10/554,314
Filed: April 19, 2006
Page 14

accordance with the teaching of Dodel to use a β -amyloid plaque-containing tissue for detecting the anti- $A\beta$ antibody following a respective dose of IgG immunoglobulins for therapy control, since Dodel is aiming at providing antibodies that bind soluble $A\beta$ in order to prevent such plaque formation. Consequently, Dodel teaches the use of ELISA assay in order to measure the anti- $A\beta$ antibody in a body fluid.

In addition, applicants respectfully disagree with the Examiner's characterization of Schenk et al., 1999.

If anything in context with brain tissue sections, Schenk et al. merely describe that brain tissue sections were investigated in order to determine whether there was a reduction of amyloid plaque load; see Schenk et al. 1999, e.g., at page 176, left column, lines 3-5:

"At each time point, brains were examined by image analysis and enzyme-linked immunosorbent assay (ELISA) **to determine the magnitude of the amyloid- β burden** and the extent of neuritic dystrophy, astrocytosis and microgliosis" (emphasis added).

Thus, Schenk et al. do not teach determining the level of antibodies against β -amyloid, let alone using a β -amyloid plaque containing brain tissue section therefore.

The claimed method is not obvious over Schenk ('523)

At page 8 of the Final Office Action, the Examiner alleges that "Schenk teaches detecting the level of antibodies in serum and CSF after treatment or immunization with AN1792 by an ELISA using different brain regions, which contain Amyloid-plaques".

However, the Schenk et al. 1999 publication does not provide such teaching. Rather, $A\beta$ burden and $A\beta$ deposition in the hippocampus and cortex in treated mice have been analyzed by using a predefined anti- $A\beta$ antibody 3D6; see Schenk et al. at page 177, right column, section

Applicants: Christoph Hock et al.
Serial No.: 10/554,314
Filed: April 19, 2006
Page 15

"Neuropathology quantification". Alternatively, another predefined antibody 8E5 was used for analysis of neuritic plaque and astrocytic burden; see the legend to Figure 2 at page 174 and Table 1 at page 177 of Schenk et al. 1999.

In fact, it appears as if the Examiner, when discussing the alleged obviousness of the claimed method over Dodel in view of Schenk et al. 1999 veered off to Schenk (US Patent No. 6,787,523), since reference is made to "see column 19, lines 3-4; column 19, lines 6-32; columns 22-28" cited in the Office Action mailed 8/17/07 in the discussion of Schenk (US' 523). However, in section 5 at page 2 of the Final Office Action, it is stated that the rejection of claims 1-10 and 18 under 35 U.S.C. 102(e) as being anticipated by Schenk et al. (US Patent No. 6,787,523) is withdrawn. Furthermore, nowhere in the present Final Office Action the Examiner raises an objection against the pending claims in view of the Schenk (US'523) reference. Thus, it is submitted that already for this reason the Final Office Action is not proper.

Nevertheless, also as a matter of fact Schenk (US'523) does not render the claimed method obvious. At page 8 of the Final Office Action the Examiner alleges that "Schenk [(US'523)] also teaches a positive correlation of treatment with Abeta peptides or anti-Abeta antibody with the effect of amyloid plaque reduction by immunohistochemical staining on brain sections of transgenic PDAPP mice".

However, this observation does not lead to the claimed method.

Schenk (US'523) in column 19, lines 6-32, cited by the Examiner, specifically teaches that the presence of, e.g., antibodies that specifically bind to A β peptide is to be determined by ELISA methods as described in the example section; see Schenk (US'523) in column 19, lines 6-10 and section "General Materials and Methods" in column 41, lines 43. Nowhere in this general description of the claimed methods of diagnosis or in the specific Materials and Methods section is there a suggestion, let alone teaching to use a β -amyloid plaque-containing

Applicants: Christoph Hock et al.
Serial No.: 10/554,314
Filed: April 19, 2006
Page 16

brain tissue section for the detection of antibody. Rather, in conformity with the general statement in column 19 referred to above, it is taught that A β and APP levels in the brain are measured by ELISA; see Schenk (US'523), for example, in column 23, lines 47-48.

If anything in context with brain tissue sections, Schenk (US'523) merely describes that brain tissue sections were investigated in order to determine whether there was a reduction of amyloid plaque load. However, this is of course different compared to method of the claimed invention.

Thus, while in accordance with the claimed method a predetermined β -amyloid plaque-containing brain tissue section is used in order to determine the presence or level of anti-A β antibodies in a test sample from a subject undergoing immunotherapy, in Schenk (US'523) **the brain tissue sections themselves represent the test sample** which is analyzed by a predetermined antibody for the presence of β -amyloid plaque load. Hence, the experiments taught in Schenk do not provide information on the presence of anti-A β antibodies but on the β -amyloid plaque load of brain tissue.

Evidently such method is not applicable for the purpose of clinical monitoring since in consequence of the teaching of Schenk (US'523) a brain tissue section would have to be obtained from the treated patient. Thus, the method Schenk (US'523) is merely sufficient to evaluate the success of an immunotherapy in a post-mortem analysis.

Furthermore, the Examiner fails to proof a *prima facie* obviousness case, let alone does he show where the element missing in Dodel and Schenk et al., i.e. to use β -amyloid plaque containing brain tissue section for the detection of anti-A β antibodies as an indicator **for the clinical outcome** of an A β mediated immunotherapy is taught, suggested or has been motivated to develop.

Applicants: Cristoph Hock et al.
Serial No.: 10/554,314
Filed: April 19, 2006
Page 17

The Examiner states that "both Dodel and Schenk teach methods of monitoring immunotherapy by detecting the level of anti-Abeta with an ELISA method including using brain homogenates".

However, this assertion is unsupported and not correct.

First, at no place do Dodel disclose, let alone teach to use brain homogenates in order to detect anti-A β antibodies. Rather plasma and cerebrospinal fluid (CSF) is used.

Second, as already discussed above Schenk et al. 1999 do not teach to use brain homogenates in order to detect anti-A β antibodies but the magnitude of the amyloid- β burden.

Third, also Schenk (US'523), when talking about brain homogenates does not teach to use brain homogenates in order to detect anti-A β antibodies but for measuring the concentration of various A β proteins with ELISA; see Schenk in column 42, line 50 "Brain tissue preparation" and in column 43, line 1 "Measurement of A β Levels".

Hence, the use of brain homogenates in the Schenk references is merely sufficient to evaluate the success of an immunotherapy in a post-mortem analysis. However, with respect to the monitoring of passive and active immunization against A β both Dodel and Schenk teach measurement of A β or anti-A β antibodies in plasma or CSF by ELISA.

In contrast, applicant's method of using β -amyloid plaque containing brain tissue section for the detection of anti-A β antibodies, as demonstrated in the examples of the present application, allows the detection of protective antibodies **in respect to the clinical course of the disease of the treated patients**, which is not related to the level of A β in plasma and CSF.

Furthermore, the Examiner further ignored that contrary to the present

Applicants: Christoph Hock et al.
Serial No.: 10/554,314
Filed: April 19, 2006
Page 18

application neither Dodel nor the Schenk references provide clinical assessments including neurophysiological tests which allow a correlation of the observed reduction of, e.g., A β burden in CSF and the **clinical outcome** of their immunotherapy.

Hence, while Dodel and Schenk teach determining the level of A β and anti-A β antibody it does not allow any conclusion as to the significance of this observation for the clinical outcome of the therapy of patients suffering from Alzheimer's disease.

Indeed, this is one significant shortcoming of the method of monitoring immunotherapy taught in Dodel and Schenk because of which applicants' contribution to the art has been acknowledged in the field of Alzheimer's disease to represent "an important step forward to ultimately treat this intractable disease"; see Sambamurti et al. at page 176, right column, last sentence. In particular, it is explained:

"An important development associated with the trial was the development of an assay termed as the tissue amyloid plaque immunoreactivity (TAPIR) assay [8]. In this assay, the immune response in vaccinated patients was evaluated by using sections from either AD brain or transgenic mouse brain. The assay was used to demonstrate that the vaccination resulted in a strong immune reaction against the aggregated form of A β_{42} but not against A β PP or its C-terminal fragments. A follow up study showed **that TAPIR reactivity correlated with improvement in cognition in the small subset of vaccinated subjects.** However, although TAPIR response correlated well with A β 42 ELISA response, the latter did not correlate well with improved cognition [9,10]. These studies clearly suggested that there may be specific forms of A β that lead to cognitive decline but most A β is normally well tolerated.

These findings emphasize that the role of A β in AD pathogenesis is complex and **that a simple failure of an A β -**

Applicants: Christoph Hock et al.
Serial No.: 10/554,314
Filed: April 19, 2006
Page 19

lowering clinical trial does not necessarily rule out the amyloid hypothesis. Instead, more research is required in understanding the mechanisms that link changes in A β PP metabolism with AD in addition to examining alternative hypotheses. The paper by Wang et al. [21] is among the first to take advantage of this interesting finding and make an antibody, 3.4A10, that shows the same TAPIR-like immunoreactivity"; see Sambamurti et al. at page 176, left column, lines 19-45 (emphasis added)

According to the teaching of Dodel and Schenk the person skilled in the art would have concluded that the immunotherapy of patients showing rather low ELISA A β antibody titers and unchanged plasma and CSF level of A β failed.

However, if the skilled person, as alleged by the Examiner, expected the same "positive" correlation between immunotherapy and immunoreactivity of amyloid plaque containing brain tissue sections as for ELISA A β antibody level, the skilled person must have thought that determining the immunoreactivity of amyloid plaque containing brain tissue sections is no better than ELISA for predicting the clinical outcome of the therapy. Thus, at first place there was no incentive for the skilled person to use amyloid plaque containing brain tissue sections for monitoring immunotherapy of Alzheimer's disease. This is all the more true since hitherto ELISA was the gold standard assay, confirmed and consistently used in the art, e.g. Dodel, and easier to perform than using brain tissue sections.

Certainly, the skilled person could not have expected that immunized patients with low ELISA A β antibody titers and unchanged plasma and CSF level of A β , when scored positive in the TAPIR assay of the claimed invention clinically improved and even performed better than patients having high ELISA titers; see the specification at page 19, the bridging paragraph to page 20 and the last paragraph at that page.

Applicants: Cristoph Hock et al.
Serial No.: 10/554,314
Filed: April 19, 2006
Page 20

For the reasons stated above, applicants maintain that the combination of Dodel et al. in view of Schenk et al. 1999 or Schenk (US'523) do not render obvious applicants' claimed invention.

Accordingly, applicants respectfully request the Examiner reconsider and withdraw this ground of rejection.

If a telephone interview would be of assistance in advancing prosecution of the subject application, applicants' undersigned attorney invites the Examiner to telephone him at the number provided below.

No fees, other than the enclosed \$120.00 fee for a one-month extension of time and the \$810.00 fee for filing a Request For Continued Examination (RCE), are deemed necessary in connection with the filing of this Amendment. Accordingly, a check in the amount of \$120.00 is enclosed and authorization is hereby given to charge the amount of \$810.00 to Deposit Account No. 03-3125. However, if any additional fee is required, authorization is hereby given to charge the amount of any such fee to Deposit Account No. 03-3125.

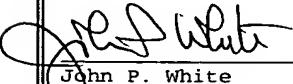
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Exhibit A

EXHIBIT 1